

Notice of Allowability

Application No.

10/027,039

Examiner

Brian J. Sines

Applicant(s)

BONNE ET AL.

Art Unit

1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the response filed 8/20/2004.
2. ☒ The allowed claim(s) is/are 1-14, 18, 19, 22, 23 and 25-34.
3. ☒ The drawings filed on 20 December 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Brian N. Tufte on 8/18/2004.

The application has been amended as follows:

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Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1. (Currently Amended) A method for ~~compensating~~ obtaining a measure of the thermal conductivity of a first component of a fluid of interest that include the first component and two or more other components using a thermal conductivity sensor, the thermal conductivity sensor having that includes a heater and a temperature sensor, wherein each of said heater and said temperature sensor are in thermal communication with the [[a]] fluid of interest, ~~and wherein the fluid of interest includes a first component and two or more other components,~~ the method comprising the steps of:
 - determining the variability range of at least one of the two or more other components in the fluid of interest;
 - energizing the heater with an input signal to induce an elevated temperature condition in said heater, the elevated temperature condition being such that the combined thermal conductivity of the two or more other components is less variable with concentration of the two or more other components than the individual thermal conductivities of the two or more other components; and
 - obtaining a measure of the thermal conductivity of the first component using said temperature sensor.

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2. (Previously Presented) The method of claim 1 wherein at least one of the two or more other components includes H₂O and at least one of the two or more other components includes CO₂, the method further comprising the steps of:
determining the variability range of CO₂ in the fluid of interest.
3. (Previously Presented) The method of claim 1 wherein at least one of the two or more other components includes H₂O, the method further comprising the step of selecting the elevated temperature condition for said heater by:
measuring the thermal conductivity of the fluid of interest over a range of temperatures; and
selecting the elevated temperature based on the thermal conductivity measurements to reduce the effect of H₂O.
4. (Previously Presented) The method of claim 2 further comprising the step of selecting the elevated temperature condition for said heater by:
measuring the thermal conductivity of the fluid of interest over a range of temperatures; and
selecting the elevated temperature based on the thermal conductivity measurements to reduce the combined effects of H₂O and CO₂.

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5. A fluid sensor for determining a selected property of one or more components in a fluid of interest, comprising:

a heater;

a thermal sensor in proximate position to said heater and in thermal

communication therewith through the fluid of interest, said sensor having

a temperature dependent output;

measuring means for obtaining a measure of the selected property of at least one

of the one or more components of the fluid of interest using said

[temperature sensor] thermal sensor; and

energizing means connected to said heater for energizing the heater to induce an

elevated temperature condition in said thermal sensor[[:]], wherein said

elevated temperature condition is selected to reduce the effect of at least

one of the components in the fluid of interest on the selected property that

is measured by the measuring means.

~~measuring means for obtaining a measure of the selected property of at least one~~

~~of the one or more components of the fluid of interest using said~~

~~temperature sensor; and wherein said elevated temperature condition is~~

~~selected to reduce the effect of at least one of the components in the fluid~~

~~of interest on the selected property that is measured by the measuring~~

~~means.~~

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6. (Previously Presented) The fluid sensor of claim 5 wherein at least one of the one or more components includes H₂O and at least another of the one or more components includes CO₂, and said elevated temperature condition is selected to reduce the effect of H₂O and CO₂.

7. (Previously Presented) The fluid sensor of claim 5 wherein said fluid sensor is used to sense hydrogen concentration in the fluid of interest.

8. (Previously Presented) The fluid sensor of claim 5 wherein the fluid of interest includes a gas.

9. (Currently Amended) A method of compensating an output of a fluid sensor that includes a heater and a temperature sensor, comprising:
determining the range of H₂O in the fluid to be sensed;
selecting a heater temperature to reduce the effect of H₂O on the output of the fluid sensor; and
heating the fluid to be sensed using the heater to the selected temperature value.

10. (Previously Presented) The method of claim 9 further comprising the steps of:
determining the range of CO₂ in the fluid to be sensed; and

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selecting the heater temperature value to reduce the effect of CO₂ on the fluid sensor.

11. (Previously Presented) The method of claim 9 wherein the selected temperature is chosen to reduce non-linear sensor resistance values caused by the H₂O in the range of H₂O concentration.

12. (Previously Presented) The method of claim 9 wherein the selected temperature is chosen to reduce non-linear sensor resistance values caused by the CO₂ in the range of CO₂ concentration.

13. (Currently Amended) A method for ~~compensating~~ obtaining a measure of the thermal conductivity of a first component of a fluid of interest that include the first component, a second component and a third component using a thermal conductivity sensor that includes, the thermal conductivity sensor having a heater and a temperature sensor, wherein each of said heater and said temperature sensor are in thermal communication with ~~[[a]] the fluid of interest, and wherein the fluid of interest includes a first component, a second component of the fluid of interest that includes polar or non-symmetrical molecules, and [[a]] the third component of the fluid of interest that includes non-polar or symmetrical molecules,~~ the method comprising the steps of:

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determining the variability range of the second component and/or the third component in the fluid of interest;

energizing the heater with an input signal to induce an elevated temperature condition in said heater, the elevated temperature condition being such that the combined thermal conductivity of the second component and the third component is less variable with concentration of the second component and the third component than the individual thermal conductivities of the second component and the third component; and obtaining a measure of the thermal conductivity of the first component using said temperature sensor.

14. (Previously Presented) The method of claim 13 wherein at least one of the first and second components includes H₂O, the method further comprising the step of selecting the elevated temperature condition for said heater by:

measuring the thermal conductivity of the fluid of interest over a range of temperatures; and
selecting the elevated temperature based on the thermal conductivity measurements to reduce the effect of H₂O.

15. (Currently Amended) A fluid sensor to sense hydrogen concentrations comprised of:

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a thin film heater;
at least one thin film temperature sensor;
a semiconductor body with a depression therein; and
the heater and temperature sensor lying in a plane substantially parallel to the
semiconductor body;
an energizer coupled to said heater, said energizer providing a control signal to
said heater to induce a predetermined temperature proximate to the heater,
said temperature being preselected to reduce the effect of a fluid from the
~~group consisting of H₂O.~~

16. (Original) The fluid sensor to sense hydrogen concentrations of claim 15
wherein said fluid sensor is operable to monitor hydrogen in a proton exchange
membrane fuel cell.

17. (Original) The fluid sensor to sense hydrogen concentrations of claim 15
wherein said fluid sensor is operable to monitor the fluid mixture composition of one or
more refrigerants.

18. (Previously Presented) The method of clam 1 wherein the elevated
temperature condition for said heater may be configured in the field.

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19. (Previously Presented) The method of claim 13 wherein the elevated temperature condition for said heater may be configured in the field.

20 - 21. (Cancel)

22. (Currently Amended) A method for compensating an output of a fluid sensor that includes a heater and a temperature sensor, comprising:

determining the range of H₂O and CO₂ in the fluid to be sensed;

energizing the heater in the fluid to be sensed to one or more temperatures and

varying the amount of H₂O and CO₂ in the fluid to be sensed while

monitoring the output of the fluid sensor;

selecting a heater temperature value to reduce the effect of H₂O and CO₂ on the output of the fluid sensor; and

heating the fluid to be sensed using the heater to the selected temperature value.

23. (Previously Presented) The fluid sensor of claim 8 wherein the output of the sensor is used to control the concentration of individual components resulting from mixing at least two components.

24. (Cancel)

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25. (Previously Presented) The fluid sensor of claim 5 wherein the fluid of interest includes a liquid.

26. (Previously Presented) The fluid sensor of claim 5 wherein the fluid of interest includes a refrigerant.

27. (Previously Presented) A method for determining the thermal conductivity of a first component in a fluid stream, wherein the fluid stream includes the first component and two or more other components, each having a thermal conductivity, wherein an approximately relative concentration of the two or more other components is known, the method comprising the steps of:

exposing a thermal conductivity sensor to the fluid stream, wherein the thermal conductivity sensor includes a heater and a temperature sensor;

elevating the temperature of the heater to an elevated temperature where the combined thermal conductivity of the two or more other components is less variable with concentration of the two or more other components than the individual thermal conductivities of the two or more other components; and

obtaining a measure of the thermal conductivity of the first component using the temperature sensor.

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28. (Previously Presented) A method according to claim 27 wherein, at the elevated temperature, the combined thermal conductivity of the two or more other components is relatively constant over a range of concentrations of the two or more other components.
29. (Previously Presented) A method according to claim 27 wherein, at the elevated temperature, the combined thermal conductivity of the two or more other components does not substantially affect the measure of the thermal conductivity of the first component.
30. (Previously Presented) A method according to claim 29 wherein, at the elevated temperature, the thermal conductivities of the two or more other components substantially cancel each other out, so that the measure of the thermal conductivity of the first component can more easily be obtained.
31. (Previously Presented) A method according to claim 27 wherein the two or more other components include a second component and a third component.
32. (Previously Presented) A method according to claim 31 wherein the second component includes H₂O.

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33. (Previously Presented) A method according to claim 32 wherein the second component includes CO₂.

34. (Previously Presented) A method for determining the thermal conductivity of a first component in a fluid stream, wherein the fluid stream includes the first component and two or more other components, each having a thermal conductivity, wherein an approximately relative concentration of the two or more other components is known, the method comprising the steps of:

exposing a thermal conductivity sensor to the fluid stream, wherein the thermal conductivity sensor includes a heater and a temperature sensor;

elevating the temperature of the heater to an elevated temperature;

obtaining a measure of the thermal conductivity of the first component using the temperature sensor; and

wherein the elevated temperature is such that the thermal conductivities of the two or more other components substantially cancel each other out so that the measure of the thermal conductivity of the first component can more easily be obtained.

Claims 15 – 17 have been canceled.

Allowable Subject Matter

Claims 1 – 14, 18, 19, 22, 23 and 25 – 34 are allowed.

The following is an examiner's statement of reasons for allowance:

The cited prior art neither teach or fairly suggest a method for obtaining a measure of the thermal conductivity of a component of a fluid as recited in claims 1, 13, 27 and 34. The cited prior art neither teach or fairly suggest a fluid sensor incorporating the use of a thermal sensor for determining a selected property of one or more components in a fluid as recited in claim 5. The cited prior art neither teach or fairly suggest a method of compensating an output of a fluid sensor as recited in claims 9 and 22.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Sines whose telephone number is (571) 272-1263. The examiner can normally be reached on Monday - Friday (11:30 AM - 8 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yelens Gakh

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primary examiner AU 1743